

## **REMARKS**

This is in response to the Office Action that was mailed on June 14, 2006. A minor formal amendment is made to claim 12. No new matter is introduced by this Amendment. Claims 12-15 remain pending in the application.

### **Kaneko in view of Takahata**

Claims 12-15 are rejected under 35 U.S.C. §103(a) as being unpatentable over EP 915,244 (Kaneko) in view of US 5,376,610 (Takahata). Office Action, pages 2-3. Kaneko neither teaches nor suggests the details of the layers in the three-way catalyst used in the presently claimed apparatuses. The Examiner argues, however, that the Takahata reference suggests the three-way catalyst.

At the top of page 7 of the Office Action, the Examiner refers to Examples 1 and 7 in the Takahata reference. In Examples 1 and 7 of the reference, the *surface layer contains palladium* and the inner layer contains platinum and rhodium. The three-way catalysts of the present invention differ significantly from those of Examples 1 and 7 of Takahata, because in the present invention *the surface layer contains platinum* while – as indicated above – the surface layer of the reference catalysts instead contain palladium.

In general, palladium is “better” than platinum, because it is activated at a lower temperature than is platinum. However, for purifying hydrocarbons in combustion involving lean air-fuel ratios, palladium is inferior to platinum.

For a three-way catalyst that is provided in an exhaust path of an internal combustion engine operable with **both** a theoretical air-fuel ratio and a lean air-fuel ratio, it is necessary to have sufficient hydrocarbon purifying performance for lean air-fuel ratios **as well as** for normal (theoretical) air-fuel ratios. The three-way catalyst of the present invention is significantly superior in this respect to the Takahata catalysts.

The three-way catalysts disclosed in Takahata are only for purifying hydrocarbons exhausted at engine start-up by means of secondary air. They cannot improve hydrocarbon purifying performance during lean air-fuel ratio operation, or during transition from a lean air-fuel ratio to a theoretical air-fuel ratio and theoretical air-fuel ratio operation, as can the three-way catalysts of the present invention.

Takahata fails to teach or suggest any three-way catalyst that has the same structure as the three-way catalysts of the present invention. Since the three-way catalysts of the present invention are, as discussed above, significantly different from those of Takahata, a construction equivalent to that of the present invention cannot be obtained by following the combined teachings of the prior art.

What is more, even if the three-way catalyst of Takahata is combined with the exhaust apparatus disclosed in the Kaneko reference, the combination will not provide the beneficial functions provided by the present invention.

Tamura in view of Kaneko and Takahata

Claims 12-15 are rejected under 35 U.S.C. §103(a) as being unpatentable over US 6,463,734 B1 (Tamura) in view of Kaneko and Takahata. Office Action, pages 3-5.

Neither Tamura nor Kaneko teaches or suggests the details of the layers in the three-way catalyst used in the presently claimed apparatuses. The Examiner argues, however, that the Takahata reference suggests the three-way catalyst.

At the top of page 7 of the Office Action, the Examiner refers to Examples 1 and 7 in the Takahata reference. In Examples 1 and 7 of the reference, the *surface layer contains palladium* and the inner layer contains platinum and rhodium. The three-way catalysts of the present invention differ significantly from those of Examples 1 and 7 of Takahata, because in the present invention *the surface layer contains platinum* while – as indicated above – the surface layer of the reference catalysts instead contain palladium. For purifying hydrocarbons in combustion involving lean air-fuel ratios, palladium is known to be inferior to platinum.

For a three-way catalyst that is provided in an exhaust path of an internal combustion engine operable with *both* a theoretical air-fuel ratio and a lean air-fuel ratio, it is necessary to have sufficient hydrocarbon purifying performance for a lean air-fuel ratio *as well as* for normal (theoretical) air-fuel ratio. The three-way catalyst of the present invention is significantly superior in this respect to the Takahata catalysts.

Also, the hydrocarbon purifying performance of rhodium in the three-way catalyst of Takahata Example 4 is inferior to that of the catalysts of the present invention, because the catalyst in Example 4 is loaded separately with rhodium and platinum. In addition, the complexity and cost of the three-way catalyst of Takahata Example 4 is higher than that of the present invention because of the three-layer structure of Example 4.

The three-way catalysts disclosed in Takahata are designed only to purify hydrocarbons exhausted at engine start-up by means of secondary air. They do not improve hydrocarbon

purifying performance during a lean air-fuel ratio operation, or during transition from a lean air-fuel ratio to a theoretical air-fuel ratio and a theoretical air-fuel ratio operation, as do the three-way catalysts of the present invention.

Takahata fails to teach or suggest any three-way catalyst that has the same structure as, or a structure similar to, the three-way catalysts of the present invention. Since the three-way catalysts of the present invention are, as discussed above, significantly different from those of Takahata, a construction equivalent to that of the present invention cannot be obtained by following the combined teachings of the prior art.

Moreover, even if the three-way catalyst of Takahata is combined with the exhaust apparatus disclosed in the cited prior art, the combination will not provide the beneficial functions provided by the present invention.

#### Double patenting

Claims 12-15 are rejected on the ground of obviousness-type double patenting over Tamura in view of Kaneko and Takahata. Office Action, page 5. This ground of rejection is respectfully traversed. Applicants' position with respect to the differences in technologies between the three cited documents and the presently claimed invention is set forth above.

#### Summary and conclusion

According to the Takahata reference, if rhodium and platinum are admixed in a layer of a catalyst, the rhodium readily forms an alloy with the platinum to cause catalyst deactivation. ***In***

*spite of this problem*, however, the three-way catalyst of the present invention provides beneficial functions, by having an inner layer that contains an admixture of both rhodium and platinum, so that the resulting catalyst of this invention can provide improved hydrocarbon purifying performance during theoretical air-fuel ratio operation and transition from a lean air-fuel ratio to a theoretical air-fuel ratio. Takahata not only does not suggest the beneficial function provided by the present invention, he even *teaches away* from it by virtue of his teaching that if rhodium and platinum are admixed in a layer of a catalyst, the rhodium readily forms an alloy with the platinum to cause catalyst deactivation.


The Examiner argues that Takahata only teaches the embodiment in which rhodium and platinum are separated as a preferred embodiment, and does not exclude an admixture of both rhodium and platinum. In the present invention, however, rhodium and platinum are admixed in the inner layer of the three-way catalyst to obtain the above-mentioned beneficial function that Takahata does not teach or suggest. That is, Takahata fails to *motivate* persons of ordinary skill in the art to admix rhodium with platinum in the manner reflected in Applicants' claims in order to obtain the above-mentioned beneficial function.

The Examiner is urged to withdraw the rejections of record. If there are any questions, the Examiner is invited to telephone Richard Gallagher (Reg. No. 28,781) at (703) 205-8008.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

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